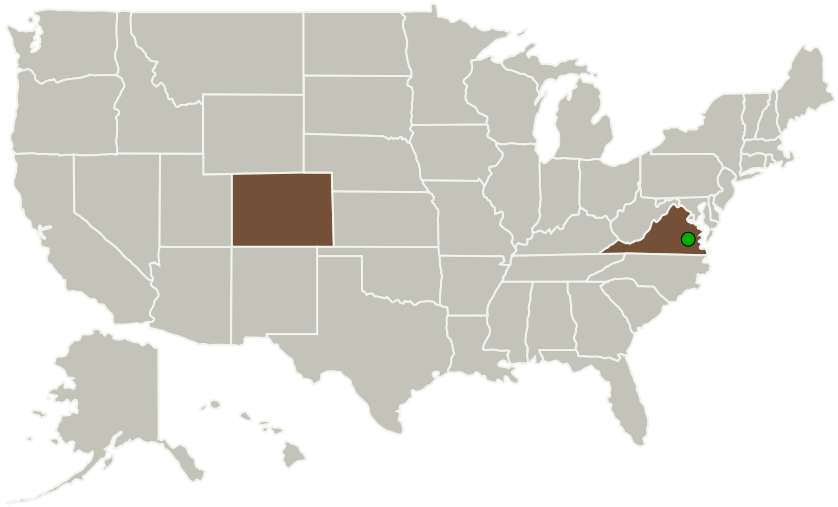
Tubular Extendible Lock-Out Composite Boom (STELOC), Phase II

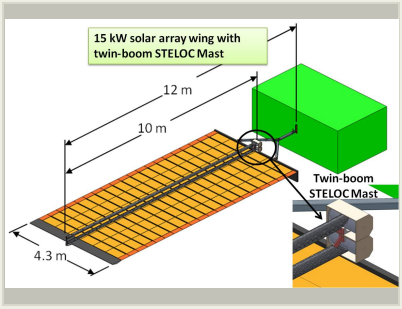
Completed Technology Project (2014 - 2016)

Project Introduction

Mass and volume efficient solar arrays are sought by NASA, DoD and commercial space to enable high power missions from 20-50 kW in the near term and eventually up to 350 kW. Currently, the maximum power available from conventional solar arrays, for a given spacecraft, is limited by either the weight or stowage volume of the honeycomb panel substrates. Flexible substrate arrays can enable higher power spacecraft by improving specific power (W/kg) and specific volume (kW/m3) as well as improving the deployed natural frequency. Typical designs for flexible substrate array require a stiff boom mechanism to deploy the array and provide the deployed structure. Heritage flexible substrate arrays have used metallic slit-tube or coilable longeron booms. To be feasible, large, next-generation flexible substrate solar arrays require deployable booms that are more thermally stable than metallic slit-tubes (STEMs), and less expensive and lighter than coilable longeron booms (i.e. AstroMast). To address this need, CTD has developed the Stable Tubular Extendible Lock-Out Composite Boom (STELOC Boom). The STELOC Boom can provide stiffness equivalent to coilable longeron booms with a significantly reduced volume, mass and cost. The Phase I program demonstrated feasibility of the STELOC boom as the deployment actuator and primary structural component of a 15 kW solar array wing. The proposed Phase II program will advance the STELOC Boom to TRL 5 through the design, fabrication and testing of a flight-like Engineering Development Unit.

Primary U.S. Work Locations and Key Partners





Tubular Extendible Lock-Out Composite Boom (STELOC), Phase II

Table of Contents

Tubular Extendible Lock-Out Composite Boom (STELOC), Phase II

Completed Technology Project (2014 - 2016)

Organizations Performing Work	Role	Type	Location
Composite Technology Development, Inc.	Lead Organization	Industry	Lafayette, Colorado
Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
Colorado	Virginia

Project Transitions

April 2014: Project Start

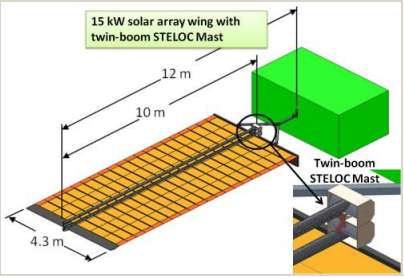
June 2016: Closed out

Closeout Summary: Tubular Extendible Lock-Out Composite Boom (STELOC), Phase II Project Image

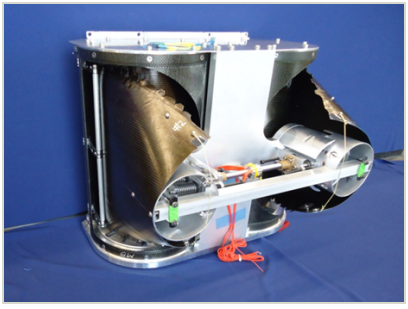
Closeout Documentation:

- Final Summary Chart Image*(https://techport.nasa.gov/file/137498)*

Images



Briefing Chart Image
Tubular Extendible Lock-Out Composite Boom (STELOC), Phase II
(https://techport.nasa.gov/image/130339)



Final Summary Chart Image
Tubular Extendible Lock-Out Composite Boom (STELOC), Phase II Project Image
(https://techport.nasa.gov/image/135966)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Composite Technology Development, Inc.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

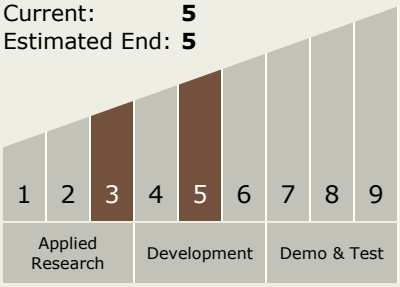
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Robert M Taylor

Technology Maturity (TRL)

Start: **3**
Current: **5**
Estimated End: **5**



Tubular Extendible Lock-Out Composite Boom (STELOC), Phase II

Completed Technology Project (2014 - 2016)

Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
  - TX12.2 Structures
    - TX12.2.5 Innovative, Multifunctional Concepts

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System